

**OFFICE MEMO**

<b>TO:</b>  Paul Hutton	<b>DATE:</b> November 19, 2001
<b>FROM:</b>  Sanjaya Seneviratne	<b>SUBJECT:</b>  Development of Flow salinity Relationships for CALSIM

CALSIM operates under many constraints to compute the inflows and exports into the Delta. At several key locations in the Delta, salinity standards are established depending on how the system is operated. CALSIM has to provide enough inflows or should cut exports to meet the salinity standards at all locations.

CALSIM used G model to determine the Net Delta Outflow (NDO) to meet the salinity standards at different locations in the Delta. The flow salinity relationship used in G model is almost exclusively dependent on the Net Delta Outflow. Because G model does not take into considerations the internal plumbing of the Delta such as the Delta Cross Channel Operation, the predictions made by the G model in the Central Delta could be more desired. The Artificial Neural Network (ANN) uses inflows of Sacramento, San Joaquin, East Side Streams and Yolo By Pass, the exports of CVP, SWP, CCC, NB and Vallejo, the Channel Depletions due to Drainage, Seepage and Irrigation and the operation of the Delta Cross Channel to predict the salinity at different locations in the Delta.

DSM2 ( 2001 Calibration) was used to calculate the EC at Jersey Point, Emmaton, Old River at Rock Slough and Collinsville for different inflows and exports. Monthly averaged flows and exports from CALSIM and daily EC values generated from DSM2 between 1975 and 1991 were fed into the Stuttgart Neural Network Simulator to calibrate the ANN. This calibrated Artificial Neural Network was fed back in to the CALSIM model. Please refer to Chapter 7 of the August 2001 Annual Progress Report to the State Water Resources Control Board for a detailed description of how ANN was integrated into CALSIM.

To ensure that the ANN produced the desired results, a full circle analysis was done. The methodology is described in Chapter 8 of the above report. Salinity calculated using ANN and DSM2 matched very well for Jersey Point, Emmaton and Collinsville. ANN calculated EC at Rock Slough had a slight over prediction when compared to DSM2 results. To overcome this problem, a multiple regression analysis was performed between Rock Slough EC and Jersey Point EC for the current month and the previous month. This regression relationship used ANN calculated Jersey Point EC to calculate Rock Slough EC.

When the Delta Modeling Section work plan was developed for the In-Delta Storage investigation the intention was to develop flow salinity relationships for all diversion and export locations using daily varying hydrology. If these were developed CALSIM would have been better able to release the required amount of water to meet export standards. Due to time constraints and the complexity in integrating daily ANN into the daily CALSIM, this work was postponed to a later date. Development of the organic ANN to predict Dissolved Organic Carbon concentrations was also postponed indefinitely due to time constraints.

